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TITLE AND SUBTITLE 1984 GORDON RESEARCH CONFERENCE ON HIGH TEMPERATURE CHEMISTRY		5. FUNDING NUMBERS 61103F 2306/A2
AUTHOR(S) Karl E. Spear		8. PERFORMING ORGANIZATION REPORT NUMBER AFOSR-DR-89-1525
PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Gordon Research Center University of Rhode Island Kingston RI 02881		10. SPONSORING / MONITORING AGENCY REPORT NUMBER AFOSR-84-0217
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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The Gordon Research Conference on High Temperature Chemistry has been held biennially since 1960. As such, it is the only regularly scheduled international meeting where the interdisciplinary group comprising high temperature science can interact and discuss forefront issues of the day. Gordon Conference surveys of part participants have indicated this conference to be extremely helpful in the generation of new research ideas and contacts. The mix of foreign, local, academic, industrial and government participants is also a recognized hallmark of such meetings.

The 1984 Conference had 17 invited talks in the areas of:

- * Cluster Formation and Properties
- * Chemistry of Inorganic Species in Flames
- * Gas-Solid Processes: Basic Surface Chemistry
- * Gas-Solid Processes: Laser Vaporization

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298-01

- * Gas-Solid Processes: Vapor Transport
- * Gas-Solid Processes: Vaporization
- * Systematic Errors in High Temp. Equilibrium Measurements
- * Modeling Condensed Phase Behavior

In Addition to these formal lectures and discussions, two invited Poster Sessions pertaining to Recent Advances in High Temperature Chemistry were held. Thirty-nine poster papers were presented, and provided a forum for in-depth discussions of other active research topics in the field. A conference program and a list of invited poster papers are attachments A and B respectively.

The conference had a total attendance of 106: 20 from outside the United States, 25 from U.S. industries, 21 from U.S. government laboratories, and 40 from U.S. universities. The last group included 10 'young' scientists (graduate students and postdoctoral associates). Attachment C is a complete registration list.

In accordance with Gordon Conference policy, no printed abstracts or papers were produced or distributed. The minutes of the conference business meeting, as prepared by the conference secretary, Dr. Clifford E. Myers, are appended as attachment D.

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- * Gas-Solid Processes: Vapor Transport
- * Gas-Solid Processes: Vaporization
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Justification	
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Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

Final Report to

Joseph W. Hager, Captain USAF
Project Manager for Grant
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Air Force Systems Command, USAF
Bolling AFB, D.C. 20332

Grant No. AFOSR-84-0217

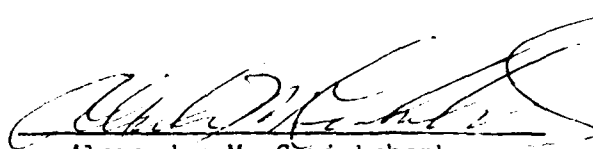
1984 GORDON RESEARCH CONFERENCE
ON
HIGH TEMPERATURE CHEMISTRY

23-27 July 1984

Brewster Academy
Wolfeboro, New Hampshire



Karl E. Spear
Conference Chairman
Materials Research Laboratory
The Pennsylvania State Univ.
University Park, PA 16802



Alexander M. Cruickshank
Director, Gordon Research Conf.
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University of Rhode Island
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3 December 1984

Final Report to
Air Force Office of Scientific Research

For Partial Support Through Grant No. AFOSR-84-0217
of the

1984 GORDON RESEARCH CONFERENCE ON HIGH TEMPERATURE CHEMISTRY
23-27 July 1984, Brewster Academy, Wolfeboro, New Hampshire

Conference Chairman
Karl E. Spear
Materials Research Lab.
The Pennsylvania State Univ.
University Park, PA 16802

Vice-Chairman
Donald L. Hildenbrand
SRI International
333 Ravenswood Ave.
Menlo Park, CA 94025

Background and Nature of Conference

The Gordon Research Conference on High Temperature Chemistry has been held biennially since 1960. As such, it is the only regularly scheduled international meeting where the interdisciplinary group comprising high temperature science can interact and discuss forefront issues of the day. Gordon Conference surveys of past participants have indicated this conference to be extremely helpful in the generation of new research ideas and contacts. The mix of foreign, local, academic, industrial and government participants is also a recognized hallmark of such meetings.

The 1984 Conference had 17 invited talks in the areas of:

- * Cluster Formation and Properties
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- * Gas-Solid Processes: Basic Surface Chemistry
- * Gas-Solid Processes: Laser Vaporization
- * Gas-Solid Processes: Vapor Transport
- * Gas-Solid Processes: Vaporization
- * Systematic Errors in High Temp. Equilibrium Measurements
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were held. Thirty-nine poster papers were presented, and provided a forum for in-depth discussions of other active research topics in the field. A conference program and a list of invited poster papers are attachments A and B respectively.

The conference had a total attendance of 106: 20 from outside the United States, 25 from U.S. industries, 21 from U.S. government laboratories, and 40 from U.S. universities. The last group included 10 'young' scientists (graduate students and postdoctoral associates). Attachment C is a complete registration list.

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Finances

A total of \$12,000. was available for disbursement by the conference chairman. Of this amount, \$7,500. was provided by the Gordon Research Conference, \$1,500. was provided by the General Electric Company, and \$3,000. was provided by the Air Force Office of Scientific Research. These funds were used to offset the fixed conference fee of \$235. and/or travel expenses of key participants -- primarily speakers and discussion leaders. A complete record of the disbursement is on file with the conference chairman and with the Gordon Research Conference Offices.

Acknowledgment and Comments

Partial support of this conference by AFOSR is greatly acknowledged. A number of key participants would not have been able to attend if partial support of their expenses had not been possible. The

1984 Conference was considered to be a great success by the participants, and helped to stimulate many new ideas in basic research areas pertinent to AFOSR. Our understanding of the high temperature behavior of materials is critical for processing and fabrication as well as for the final technological uses. Mechanical failure of structural metals, ceramics, and composites is often preceded by chemical interactions (corrosion) at high temperatures. The coupling of the chemical, thermodynamic, kinetic, and mass transport properties of materials is the key to understanding high temperature processing and behavior. The assessment and availability of reliable data for use in these analyses is critical. These are but a few of the areas which were examined from a basic viewpoint at the 1984 Conference. We are confident that the free exchange of forefront information, which was so evident at this conference, will be beneficial to existing and future AFOSR supported programs.

Gordon Research Conference on
HIGH TEMPERATURE CHEMISTRY

Brewster Academy, Wolfeboro, NH
23-27 July 1984

Chairman: Karl E. Spear

Vice-Chairman: Donald L. Hildenbrand

=====

MON. 9:00 A.M. INTRODUCTORY REMARKS/WELCOME

=====

I. CLUSTER FORMATION AND PROPERTIES

#1 - Discussion Leader: W. Weltner (Univ. Florida)
 Speaker: A.W. Castleman (Penn State Univ.)
 Title: CLUSTERS: FORMATION, REACTION AND PROPERTIES

#2 - Discussion Leader: J. Gole (Georgia Tech.)
 Speaker: E. Schumacher (Univ. Berne)
 Title: HIGH TEMPERATURE CHEMISTRY AND PROPERTIES OF CLUSTERS

MON. 7:30 P.M.

II. CHEMISTRY OF INORGANIC SPECIES IN FLAMES

#3 - Discussion Leader: C. Kolb (Aerodyne Res. Inc.)
 Speaker: C. Alkemade (Univ. Utrecht)
 Title: CHEMISTRY AND SPECTROSCOPY OF METALS IN FLAMES AND SHOCK WAVES

#4 - Discussion Leader: M. Drake (Gen. Elec., Schenectady)
 Speaker: P. Schenck (Nat. Bur. Stand.)
 Title: OPTOGALVANIC SPECTROSCOPY OF HIGH TEMPERATURE SPECIES IN FLAMES

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TUES. 8:55 A.M. - GROUP CONFERENCE PICTURE

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III. GAS-SOLID PROCESSES: BASIC SURFACE CHEMISTRY

#5 - Discussion Leader: R. Schoonmaker (Oberlin College)
 Speaker: J. Tully (Bell Labs)
 Title: MOLECULAR DYNAMICS AT SURFACES

#6 - Discussion Leader: M. Frisch (IBM, Yorktown Heights)
 Speaker: R. Hall (Exxon, Clinton NJ)
 Title: KINETICS OF SURFACE REACTIONS UTILIZING LASER EXCITATION OF THE
 SURFACE

=====

TUES. 7:30 P.M.

IV. GAS-SOLID PROCESSES: LASER VAPORIZATION

#7 - Discussion Leader: R. Hauge (Rice Univ.)
Speaker: D. Olander (Univ. Calif., Berkeley)
Title: TRANSIENT VAPORIZATION OF REFRACTORY SOLIDS BY LASER PULSE
HEATING

#8 - Session Leader: D. Hildenbrand (Stanford Res. Internat.)
Invited Poster Session: RECENT ADVANCES IN HIGH TEMPERATURE CHEMISTRY

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WED. 9:00 A.M.

V. GAS-SOLID PROCESSES: VAPOR TRANSPORT

#9 - Discussion Leader: J. Leitnaker (Oak Ridge Gas. Dif. Plant)
Speaker: H. Wiedemeier (Rensselaer Polytech. Ins.)
Title: VAPOR TRANSPORT PROCESSES UNDER MICRO-GRAVITY CONDITIONS:
THERMODYNAMIC, MASS TRANSFER, AND MORPHOLOGY ASPECTS

#10 - Discussion Leader: F. Kohl (NASA Lewis Res. Labs.)
Speaker: D. Rosner (Yale Univ.)
Title: CVD CONSEQUENCES OF VAPOR PHASE BOUNDARY LAYER PHENOMENA IN
NON-ISOTHERMAL SYSTEMS

#11 - Discussion Leader: K.D. Carlson (Argonne Nat. Lab.)
Speaker: E. Zubler (Gen. Elec., Cleveland)
Title: CHEMICAL TRANSPORT PROCESSES IN LAMPS

WED. 7:30 P.M.

VI. GAS-SOLID PROCESSES: VAPORIZATION

#12 - Discussion Leader: G. Rosenblatt (Los Alamos Nat. Lab.)
Speakers: D. Hildenbrand (Stanford Res. Internat.)
J. Drowart (Vrije Univ. Brussels)
J. Hastie (Nat. Bur. Stand.)
Topic: COMPLEX PROBLEMS IN THE INTERPRETATION OF MASS SPECTROMETRIC
DATA OF A COMPLICATED CHEMICAL SYSTEM: EXAMPLE SYSTEM OF As-O

#13 - Session Leader: D. Hildenbrand (Stanford Res. Internat.)
Invited Poster Session: RECENT ADVANCES IN HIGH TEMPERATURE CHEMISTRY

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THURS. 9:00 A.M.

----- (cont.) VI. GAS-SOLID PROCESSES: VAPORIZATION

#14 - Discussion Leader: K. Komarek (Univ. Vienna)
Speaker: Z. Munir (Univ. Calif., Davis)
Title: INFLUENCE OF AN ELECTRIC FIELD ON EVAPORATION KINETICS

#15 - Discussion Leader: L. Brewer (Univ. Calif., Berkeley)
Speaker: D. Peterson (Los Alamos Nat. Lab.)
Title: ACTINIDE VAPORIZATION AND BONDING CORRELATIONS

End of Morning Session - CONFERENCE BUSINESS MEETING

THURS. 8:00 P.M.

----- VII. SPECIAL EVENING LECTURE

#16 - Disc. Leader & Intro.: P. Gilles (Univ. Kansas)

Speaker: Leo Brewer (Univ. Calif., Berkeley)
Topic: SERIOUS SYSTEMATIC ERRORS IN HIGH TEMPERATURE EQUILIBRIUM
MEASUREMENTS

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FRI. 8:45 A.M.

----- VIII. MODELING CONDENSED PHASE BEHAVIOR

#17 - Discussion Leader: M. Blander (Argonne Nat. Lab.)
Speaker: M. Rand (AERE Harwell, UK)
Title: HIGH TEMPERATURE THERMOCHEMISTRY OF CONDENSED PHASE EQUILIBRIA

#18 - Discussion Leader: M.L. Saboungi (Argonne Nat. Lab.)
Speaker: A. Pelton (Univ. Montreal)
Title: MODELING PHASE EQUILIBRIA IN OXIDE AND SALT SYSTEMS

#19 - Discussion Leader: P. Potter (AERE Harwell, UK)
Speaker: Y.A. Chang (Univ. Wisconsin)
Title: THERMODYNAMIC MODELING AND PHASE DIAGRAM CALCULATION/PREDICTION
OF BINARY AND HIGHER ORDER SYSTEMS

ADJOURN 12:00 noon

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OTHER ITEMS

Sunday Evening: Reception(*): 6-7 P.M.
----- Dinner: 7 P.M.
Reception(*): after dinner

Thursday Evening: Reception(*): before conference banquet

(*) Beer, wine and snacks are the compliments of Aerodyne Research
Inc., Billerica, MA

Monday Morning: Get acquainted coffee for conference guests
----- Hostess: Marilyn Myers

Monday Afternoon: Open meeting of the NAS/NRC Committee on High
----- Temperature Science & Technology
Chairman: Gerd Rosenblatt

Nominating Committee Chairman: Paul Gilles

Recommendations Committee Chairman: Paul Nordine

Conference Secretary: Cliff Myers

The 1984 Gordon Research Conference on High Temperature Chemistry is
supported in part by the:

- (a) Directorate of Electronic and Material Sciences of the Air Force
Office of Scientific Research,
 - (b) Research & Development Center of the General Electric Company.
- =====

DISTRIBUTION OF SPEAKERS AND DISCUSSION LEADERS
(1984 Gordon Research Conference - High Temperature Chemistry)

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University (USA)

Speakers

L. Brewer (U. Cal.-Berkeley)
A.W. Castleman (Penn State)
Y.A. Chang (Univ. Wisconsin)
Z. Munir (U.Cal.-Davis)
D. Olander (U.Cal.-Berkeley)
D. Rosner (Yale Univ.)
H. Wiedemeier (RPI)

Discussion Leaders

F. Gilles (Univ. Kansas)
J. Gole (Georgia Tech)
R. Hauge (Rice Univ.)
R. Schoonmaker (Oberlin)
W. Weltner (Univ. Florida)

National/Industrial Laboratories (USA)

Speakers

R. Hall (Exxon, Clinton, NJ)
J. Hastie (NBS)
D. Hildenbrand (Stanford R.I.)
D. Peterson (Los Alamos)
P. Schenck (NBS)
J. Tully (Bell Labs)
E. Zubler (GE Lighting Div.)

Discussion Leaders

M. Blander (Argonne)
K.D. Carlson (Argonne)
M. Drake (GE Schenectady)
M. Frisch (IBM Yktwn Hts)
C. Kolb (Aerodyne)
F. Kohl (NASA Lewis)
J. Leitnaker (O.R. Gas. Diff.)
G. Rosenblatt (Los Alamos)
M. Sabounji (Argonne)

Foreign

Speakers

D. Alkemade (Univ. Utrecht)
J. Drowart (Vrije Univ. Brussels)
A. Felton (Univ. Montreal)
M. Rand (AERE Harwell)
E. Schumacher (Univ. Berne)

Discussion Leaders

K. Komarek (Univ. Vienna)
P. Potter (AERE Harwell)

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TUESDAY POSTERS

- R. H. Hauge
Mass Spectrometric and Matrix Isolation Studies of Laser Vaporized Materials
- Dr. J. M. Dyke
Photoelectron Spectroscopy of High Temperature Molecules and other Relative Species
- I. R. Beattie
 $\text{UCl}_4/\text{ThCl}_4$; Polyatomics in a Seeded Nozzle Beam Experiment
- Dr. Manfred M. Kappes
Spectroscopy of Mixed Metal Clusters
- Timothy D. Russell
Vapor Phase UV Absorption Spectra of the $\text{CdI}_2/\text{ScI}_3\text{NaI}$ System
- John W. Hastie
Laser Vaporization Mass Spectrometry of Graphite and BN
- Richard J. Mawhorter, Jr.
Molecules at High Temperature as Studied by High Precision Electron Diffraction
- Charles E. Kolb
Gas Phase Reaction Kinetics of Alkali Oxides and Alkali Hydroxides
- Richard Schoonmaker
Structure, Binding Energy, and Barrier to Diffusion for Alkali Halide Molecules Adsorbed on Alkali Halide (100) Surfaces
- Michael C. Drake
Laser Measurements of Superequilibrium Radical Concentrations in Turbulent Combustion
- P. A. Montano
X-ray Absorption Studies of FeCl_4 and FeBr_2 Molecules Isolated in Solid Argon
- Prof. Dr. T. Törring
Electronic Structure of Alkaline Earth Monohalides Determined by Combined LASER- and MW-Spectroscopy
- K. Hilpert
Mass Spectrometric Study of Metal Iodide Vapors and Clusters

Prof. Dr. K. H. Weil
Molecules and Clusters in the Equilibrium Vapour Over
Alkali/Antimony Systems

Milton Blander
The Prediction of Entropies and Free Energy Functions of Vapor
Molecules and Liquids

Istvan Hargittai/O. Dorofeeva, J. Tremmel, and M. Hargittai
First Row Transition Metal Dihalides: Linear and Bent

M.-L. Saboungi/J. Ellefson/W. Freyland
Thermodynamic Properties of a Liquid Semi-Conductor: The Na-Sb
System

Paul Nordine/Robert Schissman
Enthalpy of Boron Sublimation

R. D. Brittain/ K. H. Lau/R. H. Lamoreaux
Activity of Arsenic in Molten Copper

Kirk Veirs and Gerd M. Rosenblatt
Raman Scattering from Molecular Hydrogen

WEDNESDAY POSTERS

- Theodore M. Besmann
Modeling of Chemical Thermodynamic Behavior in the Fluorite-
Structure Phases $\text{UO}_{2\pm x}$, PuO_{2-x} , and $\text{U}_{1-z}\text{Pu}_z\text{O}_{2-x}$
- E. David Cater
Electron Beam and Thermal Decomposition of Dolomite, $\text{CaMg}(\text{CO}_3)_2$ -
a TEM Study
- J. S. Ogden
The Characterization of Molecular As_4O_{10} , As_4O_9 , As_4O_8 , and As_4O_7
by Matrix Isolation I.R. Spectroscopy
- O. J. Kleppa
Heats of Formation of Diborides of First Row Transition Metals by
High Temperature Calorimetry
- L. N. Yannopoulos
High Temperature Metal Oxide Semiconductor Gas Sensors
- Bret Halpern
High Temperature Oxidation of Carbon on Metals: Infrared Emission
and Modulated Fast Flow Thermionic Emission
- Prof. Dr. Kurt L. Komarek
Thermodynamics of the Non-Stoichiometry Phase β' -PdMn
- Dr. Emanuel Kaldis
Thermodynamic Properties of Mixed-Valent SmSe
- H. Spychiger
Heats of Formation, Non-Stoichiometric and Phase Diagram of the
Samarium Sulfides
- M. Tellefsen
Phase Diagrams of the Ce-H₂ and La-H₂ Systems
- J. E. Bennett
Solid-Solid Reactions Between Alkali Metal Sulfates and Graphite
- S. Lin
Material Degradation under Pulsed High Temperature and High
Pressure
- Robert F. Davis
Free Energy Minimization and Phase Equilibria in the Ti-C-N-Cl-H
System

Nathan S. Jacobson

Hot Corrosion of SiC Ceramics

Don Olander

Release of Volatile Fission Products (Xe, I, Te, and Cd) from UO_2

P. G. Wahlbeck

Validity of the Ruff-MKW Method for Determinations of Vapor Pressures, Gaseous Viscosities, and Gaseous Diffusion Coefficients

Jimmie G. Edwards

Recent Chemical and Thermodynamic Findings in the Systems: In-Se, Ga-Se, In-Te, $\text{Ga}_2\text{S-In}_2\text{S}$, Pb-Al, and Others

Malcolm W. Chase

Thermodynamic Properties of the Alkaline Earth Metals

Atilla M. Öner

High Temperature Chemistry of Fluorine/Metal Interactions

GORDON RESEARCH CONFERENCES

HIGH TEMPERATURE CHEMISTRY

JULY 22-27, 1984

Brester Academy, Wolfeboro, New Hampshire

Karl E. Spear, Chairman

Donald L. Hildenbrand, Vice-Chairman

REGISTRATION LIST

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GORDON RESEARCH CONFERENCE ON HIGH TEMPERATURE CHEMISTRY

Brewster Academy
Wolfeboro, NH
July 23-27, 1984

Minutes of the Business Meeting

The business meeting of the conference was called to order by the chairman, Karl Spear, following the morning session on Thursday, July 26, 1984, at 11:45 a.m. He reported that there were 106 conferees, 20 from outside the United States, 25 from U.S. Industries, 21 from U.S. Government Laboratories, and 40 from U.S. Universities. The last included 10 'young' scientists (graduate students and post-doctoral associates). A complete registration list is attached.

Following the tradition of the conference, it was moved, seconded and carried that Donald Hildenbrand, the 1984 Vice-Chairman, be elected Chairman of the 1986 Conference.

The Nominating Committee, which had been named on the first day of the conference and included all former chairmen present, consisted of: Paul Gilles (1962, Chairman), Leo Brewer (1960), K. Douglas Carlson (1972), E. David Cater (1978), John Hastie (1980), Gerd Rosenblatt (1974) and Karl Spear (1984).

The committee's nominees for Vice-Chairman of the 1986 conference were announced:

Robert Hauge, Rice University
Paul Nordine, Midwest Research Institute

A call was made for nominations from the floor, but there were none. Paul Nordine was elected by a secret ballot.

The Chairman called on Paul Nordine for the report of the Recommendations Committee. Committee members were:

Paul Nordine, Chairman (Midwest Research Institute)
David Bonnell (U.S. National Bureau of Standards)
Ian Beattie (University of Southampton, United Kingdom)
Franz Rosenberger (University of Utah)
Gary Sigai (GTE Sylvania R and D Labs)
Kent Casleton (U.S. Department of Energy, Morgantown)
Paul Blackburn (Argonne National Laboratory)
Michael Drake (General Electric R and D Labs)

The Committee made the following recommendations:

1. There should be a Gordon Research Conference on High Temperature Chemistry in 1986 at the same time of year as the present Conference or later, and the location of the conference should be Tilton or Brewster (Wolfeboro). A straw vote overwhelmingly favored the Brewster site.
2. The conference meeting room should be equipped with a periodic chart.
3. With respect to the poster sessions: a) there is a need for improved spacial arrangements, b) posters need to be up earlier, and c) other times (e.g., 11:30 a.m. -- 12:30 p.m.) should be considered.
4. With respect to program organization: a) the 1984 program is an excellent prototype, b) continuation of the present pattern of two or three longer lectures with discussion should be continued for some of the sessions, and c) Some of the sessions should have more numerous shorter talks on a common theme.
5. The topics covered should maintain a balance between active research areas and new directions, concepts, and methods. In this connection, a survey of the high temperature community would be helpful. A list of suggested topics is attached to these minutes.

Chairman Spear expressed his appreciation to those whom he had consulted extensively in preparing the program. He then gave over the Chair to the 1986 Chairman Elect, Donald Hildenbrand, who expressed appreciation on behalf of the conferees to Chairman Spear for his effective planning and smooth running of the present conference.

The meeting was adjourned at 12:10 p.m.

Respectively submitted,
Clifford E. Myers
Conference Secretary
July 26, 1984

1984 RECOMMENDATIONS COMMITTEE REPORT

Paul Nordine, Chairman

Next Conference

Time: Same time of year or later
Year: 1986
Location: Tilton or Wolfeboro

Need Periodic Table

(make Vice Chairman Responsible)

Posters

Need improved space
Put them up earlier
Consider other times for poster session (11:30 a.m. -- 12:30 p.m.?)

Program Organization

1984 program is an excellent prototype
Some longer lectures, two speakers plus discussion leaders
Some, more numerous shorter talks (common theme)

Topics

Maintain balance between active research areas, and new directions,
concepts, methods
Survey high temperature community

Specific Topics Covering High Temperature and Chemistry

Surfaces

Spectroscopy
New experiment
Theory
Effects of temperature change

Chemistry far from equilibrium

Turbulent systems
Intense radiation fields
Plasmas
Thick shocks
Very excited molecules

Extreme conditions

High temperatures and pressures
Fundamental properties at $T \sim 3000K$

Phase equilibria and thermodynamics

Modelling and measurements

New techniques

Calorimetry

New techniques for less well understood systems

Glasses

Slags

Liquids

etc.

High Temperature Chemistry in

The electronics industry

For energy conversion

COMMITTEES

1984 Gordon Research Conference on High Temperature Chemistry

Nominating Committee (Past Chairmen)

Paul Gilles (1962), Chairman
Karl Spear (1984)
John Hastie (1980)
Dave Cater (1978)
Gerd Rosenblatt (1974)
Doug Carlson (1972)
Leo Brewer (1960)

Recommendations Committee

Paul Nordine, Chairman
Dave Bonnell - NBS
Ian Beattie - University of Southampton
Franz Rosenberger - University of Utah
Gary Sigai - GTE Sylvania (R and D Labs)
Kent Casleton - DOE Morgantown
Paul Blackburn - ANL
Mike Drake - GE (R and D Labs)

Conference Secretary

Cliff Myers

Hostess for Monday Morning Spouses Coffee

Marilyn Myers